

# SEQUENCE LISTING

<110> Tian, Jing-Hui  
Walker, Richard I.  
Jackson, W. James

<120> Helicobacter proteins, gene sequences and uses  
thereof

<130> 7969-088

<140> To Be Assigned

<141> 2000-11-28

<160> 44

<170> PatentIn Ver. 2.1

<210> 1

<211> 1476

<212> DNA

<213> Helicobacter sp.

<400> 1

```

atggaattga atcaaccacc actccctaca gaaattgatg gtgacgctta tcataagccg 60
agttttaatg atttgggctt aaaagaatcg gttttaaaat ccgtttatga agccggcttc 120
acttcccca gccccattca agaaaaggcc attccggctg ttttgcaagg ccgagatgtc 180
atcgacacaag cccaaacagg cacaggaaaa accgcccgtt tcgctctgcc cattatcaac 240
aaccttaaaa acaaccacac catagaagcc ctagtgatca cgcccaccag agaattagcc 300
atgcaaaata gcgatgagat tttcaaattg ggcaaacaca ccaggactaa aaccgtgtgc 360
gtgtatggag gccagagcgt taaaaagcaa tgcgaattca ttaagaaaaa tccccaagtg 420
atgatcgcta caccaggaag gctgctcgat cacttaaaaa acgaacgcac ccataaattt 480
gtgcctaaag tggtcgtttt agatgaaagc gatgaaatgc tggatatggg gtttttagac 540
gatattgaag agatttttga ctacctcctt agcgaagcgc agattttgct tttttcagcc 600
acgatgccag agccgattaa aagactagcg gataagattt tagaaaaccc tattaaaatc 660
catatcgctc cttctaatat cactaacacc gacatcaccc aacgctttta tgtgatcaat 720
gagcatgaga gggccgaagc gatcatgcgc ctttttagaca cccaagcacc caaaaagagc 780
attgttttca cgcgcactaa aaaagaagcc gatgaattgc accaatccct tgcttctaaa 840
aattacaaaa gcaccgcctt gcatggggat atggatcaaa gggatcggcg ctcttctatc 900
atggcgttta aaaaaaatga cgctgatgtg ttggtggcta cagatgtggc gactcgtggg 960
ctagatatta gcggtgtaag ccatgtgttt aattaccact tgcccctaaa cactgagagc 1020
tatatccatc gcatcgggag aaccgggcga gcgggcaaaa aaggcatggc gatcacttta 1080
gtaaccctt tagaatacaa agagctttta cgcgatgcaa aagaaattga ttcagagatt 1140
gaactttttg aaatccccac cataacgaa aatcagatca tcaaacctt gcatgacgct 1200
aaagtgtctg aagggatcat cagcctttat gaacagctta ccgaaatttt tgagccgtct 1260
caattggttt taaaactttt gaggtttcag tttgaaacca gcaaaattgg cttaaaccag 1320
caagaaattg acgcgattca aaaccctaaa gaaaaaacgc caaaaccctc taacaaaaaa 1380
acgccccaac atgagcgagc gcgttctttc aaaaagggtc agcacagaga cagacaccct 1440
aaaacaaacc attattctaa aaaacccaaa cgccgt 1476

```

<210> 2

<211> 492

<212> PRT

<213> Helicobacter sp.

<400> 2

Met Glu Leu Asn Gln Pro Pro Leu Pro Thr Glu Ile Asp Gly Asp Ala  
 1 5 10 15  
 Tyr His Lys Pro Ser Phe Asn Asp Leu Gly Leu Lys Glu Ser Val Leu  
 20 25 30  
 Lys Ser Val Tyr Glu Ala Gly Phe Thr Ser Pro Ser Pro Ile Gln Glu  
 35 40 45  
 Lys Ala Ile Pro Ala Val Leu Gln Gly Arg Asp Val Ile Ala Gln Ala  
 50 55 60  
 Gln Thr Gly Thr Gly Lys Thr Ala Ala Phe Ala Leu Pro Ile Ile Asn  
 65 70 75 80  
 Asn Leu Lys Asn Asn His Thr Ile Glu Ala Leu Val Ile Thr Pro Thr  
 85 90 95  
 Arg Glu Leu Ala Met Gln Ile Ser Asp Glu Ile Phe Lys Leu Gly Lys  
 100 105 110  
 His Thr Arg Thr Lys Thr Val Cys Val Tyr Gly Gly Gln Ser Val Lys  
 115 120 125  
 Lys Gln Cys Glu Phe Ile Lys Lys Asn Pro Gln Val Met Ile Ala Thr  
 130 135 140  
 Pro Gly Arg Leu Leu Asp His Leu Lys Asn Glu Arg Ile His Lys Phe  
 145 150 155 160  
 Val Pro Lys Val Val Val Leu Asp Glu Ser Asp Glu Met Leu Asp Met  
 165 170 175  
 Gly Phe Leu Asp Asp Ile Glu Glu Ile Phe Asp Tyr Leu Pro Ser Glu  
 180 185 190  
 Ala Gln Ile Leu Leu Phe Ser Ala Thr Met Pro Glu Pro Ile Lys Arg  
 195 200 205  
 Leu Ala Asp Lys Ile Leu Glu Asn Pro Ile Lys Ile His Ile Ala Pro  
 210 215 220  
 Ser Asn Ile Thr Asn Thr Asp Ile Thr Gln Arg Phe Tyr Val Ile Asn  
 225 230 235 240  
 Glu His Glu Arg Ala Glu Ala Ile Met Arg Leu Leu Asp Thr Gln Ala  
 245 250 255  
 Pro Lys Lys Ser Ile Val Phe Thr Arg Thr Lys Lys Glu Ala Asp Glu  
 260 265 270  
 Leu His Gln Phe Leu Ala Ser Lys Asn Tyr Lys Ser Thr Ala Leu His  
 275 280 285  
 Gly Asp Met Asp Gln Arg Asp Arg Arg Ser Ser Ile Met Ala Phe Lys  
 290 295 300

Lys Asn Asp Ala Asp Val Leu Val Ala Thr Asp Val Ala Ser Arg Gly  
 305 310 315 320  
 Leu Asp Ile Ser Gly Val Ser His Val Phe Asn Tyr His Leu Pro Leu  
 325 330 335  
 Asn Thr Glu Ser Tyr Ile His Arg Ile Gly Arg Thr Gly Arg Ala Gly  
 340 345 350  
 Lys Lys Gly Met Ala Ile Thr Leu Val Thr Pro Leu Glu Tyr Lys Glu  
 355 360 365  
 Leu Leu Arg Met Gln Lys Glu Ile Asp Ser Glu Ile Glu Leu Phe Glu  
 370 375 380  
 Ile Pro Thr Ile Asn Glu Asn Gln Ile Ile Lys Thr Leu His Asp Ala  
 385 390 395 400  
 Lys Val Ser Glu Gly Ile Ile Ser Leu Tyr Glu Gln Leu Thr Glu Ile  
 405 410 415  
 Phe Glu Pro Ser Gln Leu Val Leu Lys Leu Leu Ser Leu Gln Phe Glu  
 420 425 430  
 Thr Ser Lys Ile Gly Leu Asn Gln Gln Glu Ile Asp Ala Ile Gln Asn  
 435 440 445  
 Pro Lys Glu Lys Thr Pro Lys Pro Ser Asn Lys Lys Thr Pro Gln His  
 450 455 460  
 Glu Arg Ala Arg Ser Phe Lys Lys Gly Gln His Arg Asp Arg His Pro  
 465 470 475 480  
 Lys Thr Asn His Tyr Ser Lys Lys Pro Lys Arg Arg  
 485 490

<210> 3  
 <211> 759  
 <212> DNA  
 <213> Helicobacter sp.

<400> 3  
 atggcataca aatatgatag agacttggaa tttttaaaagc aattggaatc tagtgattta 60  
 ttggatttgt ttgaggtgct tgtttttggg aaagacggcg aaaaaagaca caatgaaaaa 120  
 ctgaccagct ccatagaata caaaaggcat ggcgatgatt acgctaaata cgcagaaaga 180  
 atcgctgaag agttgcaata ctatgggagc aatagttttg cgagtttcat taaaggcgaa 240  
 ggagtcttat acaaagagat tttatgcat gtgtgcgata aattaaagggt caattacaac 300  
 aagaaaactg aaacgacttt aattgaacaa aacatgcttt ctaaaatctt agaaagaagt 360  
 ttggaagaaa tggatgatga agaagtgaag gaaatgtgct atgaattatc cataaaaaac 420  
 acggacaatt taaacagaca agccttaagc gcggcgactt taacgctggt taaaatgggg 480  
 ggttttaaat cttatcaatt agctgtcatt gttgcgaatg cggtcgcaaa aaccattcta 540  
 gggcgtggtt tategcttgc gggcaatcag gtgcttacaa gaactctgag ctttttaaca 600  
 ggtcctgttg gctggatcat tacaggcgta tggacagcga ttgatattgc agggccggct 660  
 tatagggtaa ccataccggc atgcattgtg gttgccactt tacgcctaaa aacacagcaa 720  
 gccaatggag ataagaagtc gttgcaaata gaatccatt 759

<210> 4  
 <211> 253  
 <212> PRT  
 <213> Helicobacter sp.

<400> 4  
 Met Ala Tyr Lys Tyr Asp Arg Asp Leu Glu Phe Leu Lys Gln Leu Glu  
           1                          5                          10                          15  
 Ser Ser Asp Leu Leu Asp Leu Phe Glu Val Leu Val Phe Gly Lys Asp  
                           20                          25                          30  
 Gly Glu Lys Arg His Asn Glu Lys Leu Thr Ser Ser Ile Glu Tyr Lys  
                           35                          40                          45  
 Arg His Gly Asp Asp Tyr Ala Lys Tyr Ala Glu Arg Ile Ala Glu Glu  
           50                          55                          60  
 Leu Gln Tyr Tyr Gly Ser Asn Ser Phe Ala Ser Phe Ile Lys Gly Glu  
           65                          70                          75                          80  
 Gly Val Leu Tyr Lys Glu Ile Leu Cys Asp Val Cys Asp Lys Leu Lys  
                           85                          90                          95  
 Val Asn Tyr Asn Lys Lys Thr Glu Thr Thr Leu Ile Glu Gln Asn Met  
                           100                          105                          110  
 Leu Ser Lys Ile Leu Glu Arg Ser Leu Glu Glu Met Asp Asp Glu Glu  
           115                          120                          125  
 Val Lys Glu Met Cys Asp Glu Leu Ser Ile Lys Asn Thr Asp Asn Leu  
           130                          135                          140  
 Asn Arg Gln Ala Leu Ser Ala Ala Thr Leu Thr Leu Phe Lys Met Gly  
           145                          150                          155                          160  
 Gly Phe Lys Ser Tyr Gln Leu Ala Val Ile Val Ala Asn Ala Val Ala  
                           165                          170                          175  
 Lys Thr Ile Leu Gly Arg Gly Leu Ser Leu Ala Gly Asn Gln Val Leu  
           180                          185                          190  
 Thr Arg Thr Leu Ser Phe Leu Thr Gly Pro Val Gly Trp Ile Ile Thr  
           195                          200                          205  
 Gly Val Trp Thr Ala Ile Asp Ile Ala Gly Pro Ala Tyr Arg Val Thr  
           210                          215                          220  
 Ile Pro Ala Cys Ile Val Val Ala Thr Leu Arg Leu Lys Thr Gln Gln  
           225                          230                          235                          240  
 Ala Asn Gly Asp Lys Lys Ser Leu Gln Ile Glu Ser Ile  
                           245                          250

<210> 5  
 <211> 54  
 <212> PRT

<213> Helicobacter sp.

<400> 5

Thr Glu Ile Asp Gly Asp Ala Tyr His Lys Pro Ser Phe Asn Asp Leu  
1 5 10 15

Gly Leu Lys Glu Ser Val Leu Lys Ser Val Tyr Glu Ala Gly Phe Thr  
20 25 30

Ser Pro Ser Pro Ile Gln Glu Lys Ala Ile Pro Ala Val Leu Gln Gly  
35 40 45

Arg Asp Val Ile Ala Gln  
50

<210> 6

<211> 31

<212> PRT

<213> Helicobacter sp.

<400> 6

Lys Thr Ala Ala Phe Ala Leu Pro Ile Ile Asn Asn Leu Lys Asn Asn  
1 5 10 15

His Thr Ile Glu Ala Leu Val Ile Thr Pro Thr Arg Glu Leu Ala  
20 25 30

<210> 7

<211> 26

<212> PRT

<213> Helicobacter sp.

<400> 7

Ala Met Gln Ile Ser Asp Glu Ile Phe Lys Leu Gly Lys His Thr Arg  
1 5 10 15

Thr Lys Thr Val Cys Val Tyr Gly Gly Gln  
20 25

<210> 8

<211> 41

<212> PRT

<213> Helicobacter sp.

<400> 8

Val Met Ile Ala Thr Pro Gly Arg Leu Leu Asp His Leu Lys Asn Glu  
1 5 10 15

Arg Ile His Lys Phe Val Pro Lys Val Val Val Leu Asp Glu Ser Asp  
20 25 30

Glu Met Leu Asp Met Gly Phe Leu Asp  
35 40

<210> 9  
<211> 31  
<212> PRT  
<213> Helicobacter sp.

<400> 9  
Ile Phe Asp Tyr Leu Pro Ser Glu Ala Gln Ile Leu Leu Phe Ser Ala  
1 5 10 15  
Thr Met Pro Glu Pro Ile Lys Arg Leu Ala Asp Lys Ile Leu Glu  
20 25 30

<210> 10  
<211> 23  
<212> PRT  
<213> Helicobacter sp.

<400> 10  
Asn Glu His Glu Arg Ala Glu Ala Ile Met Arg Leu Leu Asp Thr Gln  
1 5 10 15  
Ala Pro Lys Lys Ser Ile Val  
20

<210> 11  
<211> 36  
<212> PRT  
<213> Helicobacter sp.

<400> 11  
Ala Asp Glu Leu His Gln Phe Leu Ala Ser Lys Asn Tyr Lys Ser Thr  
1 5 10 15  
Ala Leu His Gly Asp Met Asp Gln Arg Asp Arg Arg Ser Ser Ile Met  
20 25 30  
Ala Phe Lys Lys  
35

<210> 12  
<211> 41  
<212> PRT  
<213> Helicobacter sp.

<400> 12  
Gly Leu Asp Ile Ser Gly Val Ser His Val Phe Asn Tyr His Leu Pro  
1 5 10 15  
Leu Asn Thr Glu Ser Tyr Ile His Arg Ile Gly Arg Thr Gly Arg Ala  
20 25 30  
Gly Lys Lys Gly Met Ala Ile Thr Leu  
35 40

<210> 13  
<211> 31  
<212> PRT  
<213> Helicobacter sp.

<400> 13  
Arg Ala Gly Lys Lys Gly Met Ala Ile Thr Leu Val Thr Pro Leu Glu  
1 5 10 15  
Tyr Lys Glu Leu Leu Arg Met Gln Lys Glu Ile Asp Ser Glu Ile  
20 25 30

<210> 14  
<211> 36  
<212> PRT  
<213> Helicobacter sp.

<400> 14  
Ile Pro Thr Ile Asn Glu Asn Gln Ile Ile Lys Thr Leu His Asp Ala  
1 5 10 15  
Lys Val Ser Glu Gly Ile Ile Ser Leu Tyr Glu Gln Leu Thr Glu Ile  
20 25 30  
Phe Glu Pro Ser  
35

<210> 15  
<211> 21  
<212> PRT  
<213> Helicobacter sp.

<400> 15  
Ser Gln Leu Val Leu Lys Leu Leu Ser Leu Gln Phe Glu Thr Ser Lys  
1 5 10 15  
Ile Gly Leu Asn Gln  
20

<210> 16  
<211> 30  
<212> PRT  
<213> Helicobacter sp.

<400> 16  
Met Ala Tyr Lys Tyr Asp Arg Asp Leu Glu Phe Leu Lys Gln Leu Glu  
1 5 10 15  
Ser Ser Asp Leu Leu Asp Leu Phe Glu Val Leu Val Phe Gly  
20 25 30

<210> 17  
<211> 38  
<212> PRT

<213> Helicobacter sp.

<400> 17

Asp Tyr Ala Lys Tyr Ala Glu Arg Ile Ala Glu Glu Leu Gln Tyr Tyr  
1 5 10 15

Gly Ser Asn Ser Phe Ala Ser Phe Ile Lys Gly Glu Gly Val Leu Tyr  
20 25 30

Lys Glu Ile Leu Cys Asp  
35

<210> 18

<211> 30

<212> PRT

<213> Helicobacter sp.

<400> 18

Leu Glu Glu Met Asp Asp Glu Glu Val Lys Glu Met Cys Asp Glu Leu  
1 5 10 15

Ser Ile Lys Asn Thr Asp Asn Leu Asn Arg Gln Ala Leu Ser  
20 25 30

<210> 19

<211> 41

<212> PRT

<213> Helicobacter sp.

<400> 19

Asn Arg Gln Ala Leu Ser Ala Ala Thr Leu Thr Leu Phe Lys Met Gly  
1 5 10 15

Gly Phe Lys Ser Tyr Gln Leu Ala Val Ile Val Ala Asn Ala Val Ala  
20 25 30

Lys Thr Ile Leu Gly Arg Gly Leu Ser  
35 40

<210> 20

<211> 49

<212> PRT

<213> Helicobacter sp.

<400> 20

Val Gly Trp Ile Ile Thr Gly Val Trp Thr Ala Ile Asp Ile Ala Gly  
1 5 10 15

Pro Ala Tyr Arg Val Thr Ile Pro Ala Cys Ile Val Val Ala Thr Leu  
20 25 30

Arg Leu Lys Thr Gln Gln Ala Asn Gly Asp Lys Lys Ser Leu Gln Ile  
35 40 45

Glu



<210> 21  
<211> 162  
<212> DNA  
<213> Helicobacter sp.

<400> 21  
acagaaattg atggtgacgc ttatcataag ccgagtttta atgatttggg cttaaaagaa 60  
tcggttttaa aatccgttta tgaagccggc ttcacttccc caagcccat tcaagaaaag 120  
gccattccgg ctgttttgca aggccgagat gtcacgcac aa 162

<210> 22  
<211> 93  
<212> DNA  
<213> Helicobacter sp.

<400> 22  
aaaaccgccc ctttcgctct gccattatc aacaacctta aaaacaacca caccatagaa 60  
gccctagtga tcacgccac cagagaatta gcc 93

<210> 23  
<211> 78  
<212> DNA  
<213> Helicobacter sp.

<400> 23  
gccatgcaaa ttagcgatga gattttcaaa ttgggcaaac acaccaggac taaaaccgtg 60  
tgcgtgtatg gaggccag 78

<210> 24  
<211> 123  
<212> DNA  
<213> Helicobacter sp.

<400> 24  
gtgatgatcg ctacaccagg aaggctgctc gatcacttaa aaaacgaacg catccataaa 60  
tttgtgcta aagtggctcg tttagatgaa agcgatgaaa tgctggatat ggggttttta 120  
gac 123

<210> 25  
<211> 93  
<212> DNA  
<213> Helicobacter sp.

<400> 25  
atTTTTgact acctccctag cgaagcgag atTTTTgcttt tttcagccac gatgccagag 60  
ccgattaaaa gactagcgga taagatttta gaa 93

<210> 26  
<211> 69  
<212> DNA

<213> Helicobacter sp.

<400> 26

aatgagcatg agagggccga agcgatcatg cgccttttag acaccaagc acccaaaaag 60  
agcattggt 69

<210> 27

<211> 108

<212> DNA

<213> Helicobacter sp.

<400> 27

gccgatgaat tgcaccaatt ctttgcttct aaaaattaca aaagcacgc cttgcatggg 60  
gatatggatc aaagggatcg gcgctcttct atcatggcgt ttaaaaaa 108

<210> 28

<211> 123

<212> DNA

<213> Helicobacter sp.

<400> 28

gggctagata ttagcgggtg aagccatgtg ttttaattacc acttgcccct aaacactgag 60  
agctatatcc atcgcatcg gagaaccggg cgagcgggca aaaaaggcat ggcgatcact 120  
tta 123

<210> 29

<211> 93

<212> DNA

<213> Helicobacter sp.

<400> 29

cgagcgggca aaaaaggcat ggcgatcact ttagtaacct ctttagaata caaagagctt 60  
ttacgcatgc aaaaagaaat tgattcagag att 93

<210> 30

<211> 108

<212> DNA

<213> Helicobacter sp.

<400> 30

atccccacca ttaacgaaaa tcagatcatc aaaaccttgc atgacgctaa agtgtctgaa 60  
gggatcatca gcctttatga acagcttacc gaaatttttg agccgtct 108

<210> 31

<211> 63

<212> DNA

<213> Helicobacter sp.

<400> 31

tctcaattgg ttttaaaact tttgagtttg cagtttgaaa ccagcaaaat tggcttaaac 60  
cag 63

<210> 32  
<211> 90  
<212> DNA  
<213> Helicobacter sp.

<400> 32  
atggcataca aatatgatag agacttggaa tttttaaaagc aattggaatc tagtgattta 60  
ttggatttgt ttgaggtgct tgtttttggt 90

<210> 33  
<211> 114  
<212> DNA  
<213> Helicobacter sp.

<400> 33  
gattacgcta aatacgcaga aagaatcgct gaagagttgc aatactatgg gagcaatagt 60  
tttgcgagtt tcattaaagg cgaaggagtc ttatacaaag agattttatg cgat 114

<210> 34  
<211> 90  
<212> DNA  
<213> Helicobacter sp.

<400> 34  
ttggaagaaa tggatgatga agaagtgaag gaaatgtgcg atgaattatc cataaaaaaac 60  
acggacaatt taaacagaca agccttaagc 90

<210> 35  
<211> 108  
<212> DNA  
<213> Helicobacter sp.

<400> 35  
aacagacaag ccttaagcgc ggcgacttta acgctgttta aaatgggggg ttttaaactct 60  
tatcaattag ctgtcattgt tgcgaatgcg gtcgcaaaaa ccattcta 108

<210> 36  
<211> 153  
<212> DNA  
<213> Helicobacter sp.

<400> 36  
ggtcctgttg gctggatcat tacaggcgta tggacagcga ttgatattgc agggccggct 60  
tatagggtaa ccataccggc atgcattgtg gttgccactt tacgcctaaa aacacagcaa 120  
gccaatggag ataagaagtc gttgcaaata gaa 153

<210> 37  
<211> 33  
<212> DNA  
<213> Helicobacter sp.

<400> 37  
cagaggggat ccatggaatt gaatcaacca cca 33

<210> 38  
 <211> 36  
 <212> DNA  
 <213> Helicobacter sp.

<400> 38  
 cagagggtcg acttaacggc gtttgggttt tttaga 36

<210> 39  
 <211> 30  
 <212> DNA  
 <213> Helicobacter sp.

<400> 39  
 gcgggatcca tggcatatac atatgataga 30

<210> 40  
 <211> 32  
 <212> DNA  
 <213> Helicobacter sp.

<400> 40  
 gcggtcgact taaatggatt ctatttgcaa cg 32

<210> 41  
 <211> 1512  
 <212> DNA  
 <213> Helicobacter sp.

<400> 41  
 atgagaggat cgcataccca tcaccatcac ggatccatgg aattgaatca accaccactc 60  
 cctacagaaa ttgatggtga cgcttatcat aagccgagtt ttaatgattt gggcttaaaa 120  
 gaatcggttt taaaatccgt ttatgaagcc ggcttcactt cccaagccc cattcaagaa 180  
 aaggccattc cggctgtttt gcaaggccga gatgtcatcg cacaagccca aacaggcaca 240  
 ggaaaaaccg ccgctttcgc tctgcccatt atcaacaacc ttaaaaacaa ccacaccata 300  
 gaagccctag tgatcacgcc caccagagaa ttagccatgc aaattagcga tgagattttc 360  
 aaattgggca aacacaccag gactaaaacc gtgtgcgtgt atggaggcca gagcgtaaaa 420  
 aagcaatgcy aattcattaa gaaaaatccc caagtgatga tcgctacacc aggaaggctg 480  
 ctgatcact taaaaaacga acgcatccat aaatttgtgc cttaaagtgt cgtttttagat 540  
 gaaagcgatg aaatgctgga tatggggttt ttagacgata ttgaagagat ttttgactac 600  
 ctccctagcg aagcgcagat tttgcttttt tcagccacga tgccagagcc gattaaaaga 660  
 ctacgggata agatttttaga aaaccctatt aaaatccata tcgctccttc taatatcact 720  
 aacaccgaca tcacccaacg cttttatgtg atcaatgagc atgagagggc cgaagcgatc 780  
 atgcgccttt tagacaccca agcaccctaa aagagcattg ttttcacgcg cactaaaaaa 840  
 gaagccgatg aattgcacca attccttgct tctaaaaatt acaaaagcac cgcttgcat 900  
 ggggatattg atcaaaggga tcggcgctct tctatcatgg cgtttaaaaa aaatgacgct 960  
 gatgtgttgg tggctacaga tgtggcgagt cgtgggctag atattagcgg tgtaagccat 1020  
 gtgtttaatt accacttgcc cctaaacact gagagctata tccatcgcat cgggagaacc 1080  
 gggcgagcgg gcaaaaaagg catggcgatc acttttagtaa cccctttaga atacaaagag 1140  
 cttttacgca tgcaaaaaga aattgattca gagattgaac tttttgaaat cccaccatt 1200  
 aacgaaaatc agatcatcaa aaccttgcat gacgctaaag tgtctgaagg gatcatcagc 1260  
 ctttatgaac agcttaccga aatttttgag ccgtctcaat tggtttttaa acttttgagt 1320  
 ttgcagtttg aaaccagcaa aattggctta aaccagcaag aaattgacgc gattcaaaac 1380  
 cctaaagaaa aaacgcaaaa accctctaac aaaaaaacgc cccaacatga gcgagcgcgt 1440

tctttcaaaa agggtcagca cagagacaga caccctaaaa caaaccatta ttctaaaaaa 1500  
 cccaaacgcc gt 1512

<210> 42  
 <211> 504  
 <212> PRT  
 <213> Helicobacter sp.

<400> 42  
 Met Arg Gly Ser His His His His His His Gly Ser Met Glu Leu Asn  
 1 5 10 15  
 Gln Pro Pro Leu Pro Thr Glu Ile Asp Gly Asp Ala Tyr His Lys Pro  
 20 25 30  
 Ser Phe Asn Asp Leu Gly Leu Lys Glu Ser Val Leu Lys Ser Val Tyr  
 35 40 45  
 Glu Ala Gly Phe Thr Ser Pro Ser Pro Ile Gln Glu Lys Ala Ile Pro  
 50 55 60  
 Ala Val Leu Gln Gly Arg Asp Val Ile Ala Gln Ala Gln Thr Gly Thr  
 65 70 75 80  
 Gly Lys Thr Ala Ala Phe Ala Leu Pro Ile Ile Asn Asn Leu Lys Asn  
 85 90 95  
 Asn His Thr Ile Glu Ala Leu Val Ile Thr Pro Thr Arg Glu Leu Ala  
 100 105 110  
 Met Gln Ile Ser Asp Glu Ile Phe Lys Leu Gly Lys His Thr Arg Thr  
 115 120 125  
 Lys Thr Val Cys Val Tyr Gly Gly Gln Ser Val Lys Lys Gln Cys Glu  
 130 135 140  
 Phe Ile Lys Lys Asn Pro Gln Val Met Ile Ala Thr Pro Gly Arg Leu  
 145 150 155 160  
 Leu Asp His Leu Lys Asn Glu Arg Ile His Lys Phe Val Pro Lys Val  
 165 170 175  
 Val Val Leu Asp Glu Ser Asp Glu Met Leu Asp Met Gly Phe Leu Asp  
 180 185 190  
 Asp Ile Glu Glu Ile Phe Asp Tyr Leu Pro Ser Glu Ala Gln Ile Leu  
 195 200 205  
 Leu Phe Ser Ala Thr Met Pro Glu Pro Ile Lys Arg Leu Ala Asp Lys  
 210 215 220  
 Ile Leu Glu Asn Pro Ile Lys Ile His Ile Ala Pro Ser Asn Ile Thr  
 225 230 235 240  
 Asn Thr Asp Ile Thr Gln Arg Phe Tyr Val Ile Asn Glu His Glu Arg  
 245 250 255

Ala Glu Ala Ile Met Arg Leu Leu Asp Thr Gln Ala Pro Lys Lys Ser  
 260 265 270  
 Ile Val Phe Thr Arg Thr Lys Lys Glu Ala Asp Glu Leu His Gln Phe  
 275 280 285  
 Leu Ala Ser Lys Asn Tyr Lys Ser Thr Ala Leu His Gly Asp Met Asp  
 290 295 300  
 Gln Arg Asp Arg Arg Ser Ser Ile Met Ala Phe Lys Lys Asn Asp Ala  
 305 310 315 320  
 Asp Val Leu Val Ala Thr Asp Val Ala Ser Arg Gly Leu Asp Ile Ser  
 325 330 335  
 Gly Val Ser His Val Phe Asn Tyr His Leu Pro Leu Asn Thr Glu Ser  
 340 345 350  
 Tyr Ile His Arg Ile Gly Arg Thr Gly Arg Ala Gly Lys Lys Gly Met  
 355 360 365  
 Ala Ile Thr Leu Val Thr Pro Leu Glu Tyr Lys Glu Leu Leu Arg Met  
 370 375 380  
 Gln Lys Glu Ile Asp Ser Glu Ile Glu Leu Phe Glu Ile Pro Thr Ile  
 385 390 395 400  
 Asn Glu Asn Gln Ile Ile Lys Thr Leu His Asp Ala Lys Val Ser Glu  
 405 410 415  
 Gly Ile Ile Ser Leu Tyr Glu Gln Leu Thr Glu Ile Phe Glu Pro Ser  
 420 425 430  
 Gln Leu Val Leu Lys Leu Leu Ser Leu Gln Phe Glu Thr Ser Lys Ile  
 435 440 445  
 Gly Leu Asn Gln Gln Glu Ile Asp Ala Ile Gln Asn Pro Lys Glu Lys  
 450 455 460  
 Thr Pro Lys Pro Ser Asn Lys Lys Thr Pro Gln His Glu Arg Ala Arg  
 465 470 475 480  
 Ser Phe Lys Lys Gly Gln His Arg Asp Arg His Pro Lys Thr Asn His  
 485 490 495  
 Tyr Ser Lys Lys Pro Lys Arg Arg  
 500

<210> 43  
 <211> 795  
 <212> DNA  
 <213> Helicobacter sp.

<400> 43  
 atgagaggat cgcattcacca tcaccatcac ggattcatgg catacaaata tgatagagac 60  
 ttggaatttt taaagcaatt ggaatctagt gatttattgg atttgtttga ggtgcttgtt 120  
 tttggtaaaag acggcgaaaaa aagacacaat gaaaaactga ccagctccat agaatacaaa 180

```

aggcatggcg atgattacgc taaatacgca gaaagaatcg ctgaagagtt gcaatactat 240
gggagcaata gttttgcgag ttctattaaa ggcgaaggag tcttatataa agagatttta 300
tgcgatgtgt gcgataaatt aaaggtcaat tacaacaaga aaactgaaac gactttaatt 360
gaacaaaaca tgctttctaa aatcttagaa agaagtttgg aagaaatgga tgatgaagaa 420
gtgaaagaaa tgtgcgatga attatccata aaaaacacgg acaattttaa cagacaagcc 480
ttaagcgcgg cgactttaac gctgtttaaa atgggggggt ttaaatctta tcaattagct 540
gtcattgttg cgaatgcggt cgcaaaaacc attctagggc gtggtttatc gcttgcgggc 600
aatcaggtgc ttacaagaac tctgagcttt ttaacagggtc ctgttggtg gatcattaca 660
ggcgtatgga cagcgattga tattgcaggg ccggcttata gggtaaccat accggcatgc 720
attgtggttg ccactttacg ctaaaaaaca cagcaagcca atggagataa gaagtcgttg 780
caaatagaat ccatt 795

```

<210> 44  
 <211> 265  
 <212> PRT  
 <213> Helicobacter sp.

<400> 44

Met	Arg	Gly	Ser	His	His	His	His	His	His	Gly	Ser	Met	Ala	Tyr	Lys
1				5					10					15	
Tyr	Asp	Arg	Asp	Leu	Glu	Phe	Leu	Lys	Gln	Leu	Glu	Ser	Ser	Asp	Leu
			20					25					30		
Leu	Asp	Leu	Phe	Glu	Val	Leu	Val	Phe	Gly	Lys	Asp	Gly	Glu	Lys	Arg
		35					40					45			
His	Asn	Glu	Lys	Leu	Thr	Ser	Ser	Ile	Glu	Tyr	Lys	Arg	His	Gly	Asp
	50					55					60				
Asp	Tyr	Ala	Lys	Tyr	Ala	Glu	Arg	Ile	Ala	Glu	Glu	Leu	Gln	Tyr	Tyr
	65				70					75					80
Gly	Ser	Asn	Ser	Phe	Ala	Ser	Phe	Ile	Lys	Gly	Glu	Gly	Val	Leu	Tyr
				85					90					95	
Lys	Glu	Ile	Leu	Cys	Asp	Val	Cys	Asp	Lys	Leu	Lys	Val	Asn	Tyr	Asn
			100					105					110		
Lys	Lys	Thr	Glu	Thr	Thr	Leu	Ile	Glu	Gln	Asn	Met	Leu	Ser	Lys	Ile
		115					120						125		
Leu	Glu	Arg	Ser	Leu	Glu	Glu	Met	Asp	Asp	Glu	Glu	Val	Lys	Glu	Met
	130					135					140				
Cys	Asp	Glu	Leu	Ser	Ile	Lys	Asn	Thr	Asp	Asn	Leu	Asn	Arg	Gln	Ala
	145				150					155					160
Leu	Ser	Ala	Ala	Thr	Leu	Thr	Leu	Phe	Lys	Met	Gly	Gly	Phe	Lys	Ser
			165						170					175	
Tyr	Gln	Leu	Ala	Val	Ile	Val	Ala	Asn	Ala	Val	Ala	Lys	Thr	Ile	Leu
		180					185						190		
Gly	Arg	Gly	Leu	Ser	Leu	Ala	Gly	Asn	Gln	Val	Leu	Thr	Arg	Thr	Leu
		195					200					205			

Ser Phe Leu Thr Gly Pro Val Gly Trp Ile Ile Thr Gly Val Trp Thr  
210 215 220

Ala Ile Asp Ile Ala Gly Pro Ala Tyr Arg Val Thr Ile Pro Ala Cys  
225 230 235 240

Ile Val Val Ala Thr Leu Arg Leu Lys Thr Gln Gln Ala Asn Gly Asp  
245 250 255

Lys Lys Ser Leu Gln Ile Glu Ser Ile  
260 265